CALL OPTIMIZATION IN AD-HOC CONFERENCE CALLS

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Cross Reference to Related Applications

5   The present invention is a continuation-in-part of
application 09/572,199 -- entitled "Call Optimization in
Ad-Hoc Conference Calls," filed 17 May 2000, naming
Shmuel Shaffer and Charles J. Bedard as inventors --
10   which is hereby incorporated by reference in its
entirety.

Background of the Invention

The present invention is related to a method and
15   system to be utilized in at least one data communications
network wherein conference calls are established.

Description of the Related Art

A data communications network is the interconnection
20   of two or more communicating entities (i.e., data sources
and/or sinks) over one or more data links. A data
communications network allows communication between
multiple communicating entities over one or more data
communications links.

25   A data communications network can be used to support
a conference call. With reference now to Figure 1, shown
is a data communications network in a conference call
configuration. Depicted are three humans A, B, and D
interacting with application programs on computers 102,

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104, and 106 in order to participate in the conference call. The interaction with the application programs typically involves the utilization of microphones, speakers, keyboards, and/or graphical user interfaces on
5   computers 102, 104, and 106. For example, when a user speaks into a microphone and listens to a speaker of a computer where an application program is resident and running. For sake of clarity, only conferenced-in computer 102 is explicitly shown as having application
10 programs 100, 101, and 103 but it is to be understood that similar application programs are present on computers 104 and 106, although such additional application programs are not shown.

For sake of illustration, the discussion herein
15 depicts and describes logical entities as if they are application programs running on computers. For example, multipoint controller 118 and multipoint processor 120 are depicted and described as if they were subprograms of conferencing engine 126 which is itself depicted and
20 described as a program resident within and running on network computer 110; participant A client application program 100, media transport part 101 of terminal entity A, and signaling part 103 of terminal entity A are depicted and described as if they are programs resident
25 within and running on computer 102; and user C client application program 132, media transport part 133 of terminal entity C, and signaling part 135 of terminal entity C are depicted and described as if they are programs resident within and running on computer 134.
30 However, those skilled in the art will appreciate that such treatment is merely illustrative and that the logical entities depicted and described herein may be implemented as hardware or any combination of hardware

and software (e.g., in one implementation multipoint
processor 120 is actually a stand-alone processor).

Illustrated is that media (e.g., audio or visual
data presented to human users A, B, and D through their
5   respective applications programs) exchanged between the
application programs of conference call participants A,
B, and D are carried by media transport channels 112,
114, and 116. As used herein, media transport channels
refer to channels sufficient to meet defined data
10   transmission needs for individual conference calls.
Those skilled in the art will recognize that the
definition of such data transmission needs can be pre-set
by a particular data communications system, or can be set
and/or reset by one or more conference call participants
15   at call initiation and/or during a conference call. In
any event, as used herein the term "media transport
channels" refers to data communications channels
sufficient to substantially meet such user media
transmission requirements.

20   Media transport channels 112, 114, and 116
respectively connect individual media transport parts of
terminal entities resident on computers 102, 104, and 106
to multipoint processor 120. However, for sake of
clarity only media transport part 101 of terminal entity
25   A of computer 102 is shown, but it is to be understood
that similar media transport parts are present on
computers 104 and 106, although such media transport
parts are not shown. Multipoint processor 120 is a
conferencing engine 126 component that ensures that data
30   is appropriately mixed and sent to various participants
engaging in the conference call (e.g., data received over
media transport channel 112 is mixed and sent out over
media transport channels 114 and 116).

The establishment of media transport channels such
as media transport channels 112, 114, and 116 is managed
by call manager 108. Call manager 108 establishes and
tears down media transport channels in response to call
5 management signals sent to call manager 108 by multipoint
controller 118, and signaling parts of terminal entities
located within computers 102, 104, and 106. For ease of
illustration, only one signaling part of a terminal
entity (i.e., signaling part 103 of terminal entity A
10 resident within computer 102) is shown, but it is to be
understood that similar signaling parts are present on
computers 104 and 106, although such signaling parts are
not shown.

Referring now to Figure 2, depicted is event 200
15 showing input from human user A to application program
100 (e.g., human user A punching a "conference call"
button on a voice terminal or human user A clicking a
conference call icon on a graphical user interface)
requesting that a user (e.g., user C) be added to the
20 ongoing conference call between call participant A, call
participant B, and call participant D. Illustrated is
that, in response to event 200, application program 100
causes signaling part 103 of terminal entity A to send a
call management message 202 over call management channel
25 122 (as used herein, "call management channels" equate to
"signaling channels" and such terms may be considered
essentially interchangeable) informing call manager 108
of the request to extend an invitation to the conference
call.

30 Shown is that, in response to message 202, call
manager 108 sends message 204 to multipoint controller
118 wherein call manager 108 informs multipoint
controller 118 that call manager 108 has received a

request from terminal entity A to extend an invitation to join the conference call to a non-participating party, and asks multipoint controller 118 for instructions. Depicted is that, in response to message 204, multipoint controller 118 sends call manager 108 instructions that call manager is to (1) place the multipoint processor connection for terminal entity A in temporary suspension (as used "in temporary suspension" means that the multipoint processor connection for terminal entity A is temporarily suspended while other conference call participants (e.g., human B and human D) are allowed continue to engage in normal conference call activities), (2) provide terminal entity A with dial tone, and (3) allow human user A to dial the number of a terminal associated with a human user whom human user A desires to invite to join the conference call.

With reference now to Figure 3, illustrated is that call manager 108, in response to the direction of multipoint controller 118, has placed media transport channel 112 in temporary suspension. Shown is event 300 wherein, in response to dial tone presented by call manager 108, human user A inputs (e.g., by a numeric keypad of computer 102) the telephone number, of the terminal associated with human user C, into application program 100. In response, application program 100 causes signaling part 103 of terminal entity A to send message 302 to call manager 108 wherein call manager 108 is informed of the telephone number of terminal entity C. In response, call manager 108 sends (a) message 304, over call management signaling channel 122 to signaling part 103 of terminal entity A directing that a media transport channel be established with terminal entity C.

Depicted is that, in response to message 304 media
transport channel 308 is established. Subsequent to the
establishment of media transport channel 308, illustrated
is human C answering (e.g., via human speech after
5 picking up a telephone handset) "hello." In response,
shown is that human user A extends an oral invitation to
join the conference call. Illustrated is that human C
orally accepts the invitation.

Referring now to Figure 4, shown is event 400
10 wherein is depicted that in response to human user C's
oral acceptance of human user A's oral invitation to join
the conference call, human user A enters input (e.g., via
depressing an "add to conference button" on a graphical
user interface, or on a physical telephone terminal)
15 directing that terminal entity C be added to the
conference call. Illustrated is that in response to
event 400, signaling part 103 of terminal entity A sends
message 402 to call manager 108 asking to transfer the
terminal with which terminal entity A is currently
20 connected (i.e., terminal entity C) to the conference
call. In response to message 402, shown is that call
manager 108 sends message 404 to multipoint controller
118 telling multipoint controller 118 that a request to
add terminal entity C to the conference call has been
25 received from terminal entity A. In response to message
404, shown is that multipoint controller 118 directs 406
call manager 108 to take the multipoint controller
connection for terminal entity A off temporary suspension
(i.e., reactivate media transport channel 112) and to
30 establish a media transport channel between a given port
of multipoint processor 120 and media transport part 133
of terminal entity C.

In response to direction 406, call manager
substantially simultaneously (a) sends, via call
management channel 122, message 408 directing signaling
part 103 of terminal entity A to tear down media
5   transport channel 308 and accept connection with media
transport channel 112 (which has been in temporary
suspension), and (b) sends, via call management channel
154, message 410 directing signaling part 135 of terminal
entity C to tear down media transport channel 308.

10   With reference now to Figure 5, depicted is that
call manager 108 directs 500 multipoint controller 118 to
originate a media transport channel with media transport
part 133 of terminal entity C. Consequently, in response
to direction 500, shown is that media transport channel
15   144 is established. Also shown is that media transport
channel 112 has been reestablished.

Those having skill in the art will recognize that
significant "cost" (as used herein, the term "cost" can
reflect network efficiency costs, monetary costs,
20   reliability costs, or any combination of the foregoing)
is associated with establishing and maintaining media
transport channels. It has been discovered by the
inventors named herein ("inventors"), and such discovery
forms part of the inventive content of this patent
25   application, that a method and system can be devised that
will substantially optimize calling by decreasing the
costs associated with conference calls by decreasing the
number of media transport channels that must be set up
and torn down in order to establish a conference call and
30   by allowing the direction of call origination when adding
participants to conference calls to be done in a
substantially optimum fashion. How embodiments achieve

the foregoing will become apparent in the detailed
description, below.

Summary of the Invention

The inventors have devised a method and system
5   which, among other things, can be utilized to allow
substantial optimization of call direction and network
connections in ad-hoc mode conference calls.

A method and system for adding a participant to a
conference call is described. In one embodiment a method
10 can include but is not limited to the following: in
response to a multipoint controller receiving a request
to extend an invitation to an ongoing conference call to
a first terminal, establishing a Call Optimization
Application (COA) channel between a Multipoint
15 Controller-Call Optimization Application (MC-COA) and a
Call Optimization Application co-resident with the first
terminal (Terminal-COA), said establishing a COA channel
effected via instant messaging following an address
resolution; exchanging cost information data between the
20 Terminal-COA and the MC-COA; determining an optimal media
transport channel origination strategy in response to the
cost information data; sending the Terminal-COA an
invitation to join the conference call, the invitation
having associated information consonant with the optimal
25 media transport channel origination strategy; receiving,
with the MC-COA, a message from the Terminal-COA
containing human user input received in response to the
invitation to join; and responding to the message
containing the human user input. In another embodiment,
30 a system can include but is not limited to a computer
program implementing the foregoing described method.

In another embodiment, a method for adding a
participant to a conference call can include but is not

limited to the following: in response to a multipoint
controller receiving a request to extend an invitation to
an ongoing conference call to a first terminal,
attempting to establish, via instant messaging, a Call
5   Optimization Application (COA) channel between a
Multipoint Controller-Call Optimization Application (MC-
COA) and a Call Optimization Application co-resident with
the first terminal (Terminal-COA). In another
embodiment, a system can include but is not limited to a
10   computer program implementing the foregoing described
method.

     In another embodiment, a method for accepting an
invitation to an ongoing conference call can include but
is not limited to the following: receiving, with a Call
15   Optimization Application co-resident with a first
terminal (Terminal-COA), an invitation to the first
terminal to join an ongoing conference call over a Call
Optimization Application (COA) channel established via
instant messaging; and responding to the invitation to
20   join in response to human user input to an interface
activated in response to the invitation. In another
embodiment a system can include but is not limited to a
computer program implementing the foregoing described
method.

25   The foregoing is a _summary_ and thus contains, by
necessity, simplifications, generalizations, and
omissions of detail; consequently, those skilled in the
art will appreciate that the summary is _illustrative only_
and is _not_ intended to be in any way _limiting_. Other
30   aspects, inventive features, and advantages of the
present invention, as defined solely by the claims, will
become apparent in the non-limiting detailed description
set forth below.

Brief Description of the Drawings

The present invention may be better understood, and
its numerous objects, features, and advantages made
apparent to those skilled in the art, by referencing the
5   accompanying drawings.

Figures 1-5 show related-art processes and devices
for inviting and joining parties into conference calls.

Figure 6 depicts how processes and devices,
described herein, begin to diverge radically from the
10   related-art processes and devices depicted in related-art
Figures 1-5, beginning at around event 204 as shown in
related-art Figure 2, and also shows that such divergence
is substantially transparent to related-art processes and
devices.

15   Figures 7-16 illustrate how processes and devices
described herein provide for inviting and joining parties
to conference calls, but in a way that substantially
optimizes the way in which such parties are invited and
added, and also show that the processes and devices
20   described herein are substantially transparent to
related-art processes and devices in that the processes
and devices described herein operate with very little
additional interaction with such related-art processes
and devices.

25   Figure 17 shows how the processes and devices
described herein achieve the result of the addition of a
user to a conference call as was depicted related-art
Figure 5, but in a much more call optimized fashion than
that available in the related-art.

Figures 18A and 18B depict a high-level logic flowchart of an embodiment of a method for inviting and joining parties into conference calls.

The use of the same reference symbols in different
5   drawings indicates similar or identical items.

Detailed Description

The following sets forth a detailed description of a mode for carrying out embodiments described. The
10   description is intended to be illustrative of the invention and should not be taken to be limiting.

Referring now to Figure 6, illustrated is a network having a flow of events substantially similar to the flow of events shown in related-art Figure 2, up to and
15   including the event of the sending of message 204 wherein call manager 108 informs multipoint controller 118 that call manager 108 has received a request from terminal entity A to extend an invitation to join the conference call to a non-participating party, and asks multipoint
20   controller 118 for instructions. However, depicted is that instead of message 206 as described in related-art Figure 2, shown in Figure 6 is that in response to message 204 multipoint controller 118 sends message 600 which instructs the call manager to wait for further
25   instructions.

With reference now to Figure 7, since multipoint controller 118 has learned via message 204 that terminal entity A is requesting that an invitation to a conference call be extended to terminal entity C, shown is that
30   multipoint controller 118 logically connects 700 (via call management channel 128) call manager 108 with multipoint controller call optimization application (MC-

COA) 702, depicted as a program resident within network
computer 110. Thereafter, shown is that MC-COA 702
communicates and works with call manager 108, via
multipoint controller 118 and call management channel

5   128, such that human user A is presented with the same
"user experience" depicted and described in relation to
related-art Figure 3, in that human user A is presented
with a dial tone and allowed to enter the number of
terminal entity C, which is associated with human user C

10 to whom human user A desires to extend an invitation to
join the conference call.

Referring now to Figure 8, depicted is that,
subsequent to MC-COA 702 receiving the connection address
(e.g., a telephone number) of terminal entity C, MC-COA

15 702 sends message 800 informing multipoint controller 118
that MC-COA 702 has the connection address (e.g., a
telephone network connection number). Thereafter, the
invitation to join the conference call will be extended
in an automated fashion as depicted and described below.

20 With reference now to Figure 9, illustrated is that
computer 110 (wherein multipoint controller 118 resides)
and computer 134 (wherein terminal entity C resides) both
have relatively constant access to one or more
essentially free (i.e., very low cost, as the term "cost"

25 was defined in the description of the related art section
above) network connections whose properties, for one
reason or another, render them insufficient to serve as
media transport channels. (Such connections are types of
"non-media-transport-channel supporting" connections. The

30 term "media-transport-channel-supporting connection," as
used herein, means a network connection having
capabilities sufficient to support defined media
transport channel requirements such as were discussed in

the description of the related art section above. The
term "non-media-transport-channel-supporting connection,"
as used herein, means a network connection having
capabilities which are NOT sufficient to support defined
5   media transport channel requirements such as were
discussed in the description of the related art section
above.) For reasons that will become apparent below, MC-
COA 702 is going to attempt to establish a channel, via
use of one of those essentially free network connections,
10   with its counterpart (e.g., COA-C 1004 in Figure 10) on
computer 134.

Accordingly, once MC-COA 702 decides what type of
connection it will use (e.g., MC-COA 702 decides to use
an IP network connection), shown is that MC-COA 702
15   consults 900 directory 902 containing entries to
associate connection addresses (e.g., telephone network
numbers) of terminals with non-media-transport-channel-
supporting connection addresses (e.g., convert to
different type protocol network addresses; for example,
20   convert the telephone number of terminal entity C to the
IP address of computer 134 housing terminal entity C
and/or an Instant Messaging service identifier associated
with human C (e.g., if human C had an America Online
(AOL) Instant Messenger username of "Mike_Smith,"
25   consultation 900 would return the AOL Instant Messenger
username "Mike_Smith")). With the address so determined,
MC-COA 702 can establish the desired channel either via
IP services by use of the IP address of computer 134
housing terminal C or via Instant Messaging services via
30   the instant messaging identifier associated with human C
(e.g., username "Mike_Smith"). Note that use of the
Instant Messaging services allows human C to be contacted
at virtually any machine having Instant Messaging

software which allows human user C's Instant Message
username to be "seen," or detected as active, by Instant
Messaging software). Background information on the
Internet, Web, and Instant Messaging can be gleaned from
5   P. Gralla, *How the Internet Works* (Millennium Edition
1999), which is hereby incorporated by reference in its
entirety; for background information specifically
regarding Instant Messaging, see especially pages 114-115
of *How the Internet Works*.

10   Referring now to Figure 10, shown is that MC-COA 702
using the network address resulting from the resolution
of the connection address (e.g., a telephone number or
Instant Messaging username (e.g., "Mike_Smith")) of
terminal entity C, opens 1000 "COA" channel 1002 with
15   Cost Optimization Application co-resident with terminal
entity C (COA-C) 1004 over an essentially free network
(e.g., via opening an IP connection via an IP network or
via opening an Instant Messaging connection via use of
Instant Messaging services such as AOL Instant Messenger
20   services). Subsequent to opening COA channel 1002, MC-
COA 702 sends message 1006 to COA-C 1004 asking COA-C
1004 to determine the costs associated with terminal
entity C originating a media transport channel with
multipoint processor 120, as viewed from the standpoint
25   of computer 134 (e.g., the network location of terminal
entity C).

     With reference now to Figure 11, depicted is that
COA-C 1004 gathers cost information, as viewed from the
standpoint of computer 134 (e.g., how much it would cost
30   if terminal entity C originated a media transport channel
with multipoint processor 120), and sends 1100 such
gathered cost information to MC-COA 702 over COA channel

1002. Once MC-COA 702 has this information, it can make cost optimization assessments.

Referring now to Figure 12, illustrated is event 1200 wherein is depicted that MC-COA 702, upon receipt of "cost" information viewed from the standpoint of computer 134 (i.e., message 1100), compares such received "cost" information against "cost" information (either previously or contemporaneously gathered) associated with multipoint controller 118 originating a media transport channel with terminal entity C, as viewed from the standpoint of computer 110 (the network location where multipoint controller 118 is resident). Thereafter, event 1202 shows that MC-COA 702 directs 1204 COA token generator 1208 to generate token 1206 containing information relating that an invitation to the conference call is being extended by human user A along with the information most commensurate with cost optimization (e.g., whether it would be more cost effective for terminal entity C to originate a media transport channel to multipoint processor 120, as opposed to vice versa). Thereafter, event 1209 depicts that MC-COA 702 sends token 1206 to COA-C 1004 over COA channel 1002 (recall that COA channel 1002 can be established in various ways, such as via Instant Messaging services).

Those skilled in the art will recognize that token 1206 may contain numerous fields containing information related to the invitation and/or call optimization criteria. In one embodiment, the token contains a "token ID" field, a "conference ID" field (identifying the ongoing conference call), a "network address of the computer wherein the multipoint controller resides" field (such as an IP address or an Instant Messaging services username (e.g., username "Multi-Point_Controller"

utilized to allow COA channel establishment and
communication, since the COA channel can be established
over many different types of networks and services such
as IP networks or Instant Messaging services), a "request

5   that invitee originate media transport channel into a
conference call" field (where such request can be made
for cost advantage or other reasons, as described below),
a "conference password" field (to be used to enter a
conference call should an invitee originate a media

10 transport channel into a conference call), a "name of the
multipoint call initiator for toll settlement" field
(sometimes utilized to "reverse the charges" when an
invitee agrees to originate a call into a conference
call, but doesn't want to bear the charges of such

15 origination), and also may have a "names of other
participants in the conference call" field.

     With reference now to Figure 13, shown is that COA-C
1004 upon receipt of token 1206, passes 1302 token 1206
to COA-C token processor 1304. COA-C token processor

20 1304 decodes the information in token 1206 and informs,
via message 1306, COA-C 1004 of that information. Shown
is that, in response to message 1306, COA-C 1004 presents
graphical user interface (GUI) 1308 on a visual display
device of network station 134 wherein varying buttons can

25 be (depending on the outcome of the cost optimization
decision, discussed above) presented stating that human
user C is being invited to a conference call by human
user A, and is being requested to initiate a call into
the conference. Shown is the set of buttons which would

30 occur if it had been determined that it was most cost
effective for terminal entity C to originate the media
transport channel.

Referring now to Figure 14, shown is event 1400 of human user C "clicking" on the send button of GUI 1308 (any invitation choice could be selected, but for sake of illustration shown in Figure 14 is that the first choice is selected). Thereafter event 1402 depicts that in response to input from human user C via GUI 1308, COA-C 1004 sends message 1404 to COA-C token generator 1406 to modify token 1206 to indicate the invitation option selected by human user C's input. Thereafter, COA-C token generator 1406 passes modified-token 1408 to COA-C 1004 which thereafter sends 1410 modified-token 1408 (having fields modified to show the invitation option indicated by human user C) back to MC-COA 702.

With reference now to Figure 15, depicted is an event wherein is shown that MC-COA 702, upon receipt of modified-token 1408, passes 1502 modified-token 1408 to MC-COA token processor 1504. MC-COA token processor 1504 decodes the information in modified-token 1408 and informs, via message 1506, MC-COA 702 of that information. Shown is that, in response to message 1506, MC-COA 702 sends message 1508 containing information as to human user C's response to the extended invitation and any call optimization options which were presented via GUI 1308 described in relation to Figure 13. Also shown is that COA-C 1004 sends message 1510 to application program 132, if human user C elected to originate the media transport channel from his machine, directing that terminal C originate the media transport channel.

Referring now to Figure 16, illustrated is that in response to message 1508, multipoint controller 118 can: (a) take no action (e.g., if user C actively rejected the invitation), (b) act "as if" terminal entity C were joining a "meet me" conference call by directing call

manager 108 to connect any terminal calling in and
authenticating itself with a conference password (which
was contained in token 1206 and modified-token 1408) to a
port of multipoint processor 120 associated with (via a
5   conference ID which was contained in token 1206 and
modified-token 1408) the ongoing conference call between
terminals A, B, and D; or (c) direct call manager 108 to
initiate a media transport channel to span between media
transport part 133 of terminal entity C and multipoint
10   processor 120. With network connection instructions now
fully specified, a media transport channel can be
established in a substantially cost-optimized fashion
between multipoint processor 120 and media transport part
133 of terminal entity C.

15   Referring now to Figure 17, depicted is that a media
transport channel 144 has been established in a
substantially cost-optimized fashion (e.g., in accord
with the actions described in relation to Figure 16)
between multipoint processor 120 and media transport part
20   133 of terminal entity C.

Note that the state of the network in Figure 17 is
substantially the same as that depicted in related-art
Figure 5. However, comparing the series of events
depicted in Figures 1-5 with the series of events
25   depicted in Figures 6-17, it can be seen that the network
state reached in Figure 17 was reached without
establishing media transport channel 308 of related-art
Figure 3, and that the direction the origination of media
transport channel 144 has been achieved in a
30   substantially optimized fashion. This gives significant
cost efficiency advantages over the related art.

In addition to the foregoing, also note that foregoing described scheme allows an invitee to an ad-hoc conference call to conference in "as if" the invitee were joining a "meet me" conference call in a way that is

5   substantially backwards compatible with existing systems. The way in which this is done is described in detail above and below, but can be summarized as follows. When a terminal is invited to join an ad-hoc conference call, a "conference id" unique to the invited terminal is

10   created. Thereafter, if it is determined to be more advantageous for the invitee to call in to the ad-hoc conference call, a multipoint controller instructs a call manager that if a terminal calls in and authenticates itself with a password, the call manager should connected

15   the calling in terminal to a particular port of a multipoint controller, where that particular port will be one that will give the calling in terminal access to the ad-hoc conference call to which it was originally invited. Note that from an existing equipment

20   standpoint, the foregoing is substantially transparent, in that the call manager will be instructed just as it would for any meet me conference call, and that only a relatively small amount of functionality would need be added to the multipoint controller. Consequently, the

25   scheme described herein has as one of its benefits substantially compatible backwards compatibility with existing systems.

The foregoing discussion has utilized Figures 1-17 to demonstrate a device and process for providing a

30   mechanism to allow more cost efficient conference calls. The following is a more formal and enhanced description of the forgoing-described process.

With reference now to Figures 18A, 18B, and Figures 1-17, depicted is a high-level logic flowchart illustrating in more detail a process by which a multipoint controller can make more cost-efficient

5   conference calls. Method step 1800 shows the start of the process. Method step 1802 depicts an inquiry as to whether multipoint controller has been notified that terminal A is requesting to add terminal entity C to an ongoing conference call? (e.g., as depicted in Figure 6

10 and described in its accompanying text). In the event no such request is received, the process returns to method step 1802.

In the event that a request to add terminal entity C to the ongoing conference call is received, method step

15 1804 illustrates the initiation of a Multipoint Controller Call Optimization Program (MC-COA) (e.g., as depicted in Figure 7 and described in its accompanying text). Thereafter, method step 1806 shows that the MC-COA obtains and resolves the connection address for

20 terminal entity C into a non-media-transport-channel-supporting connection address (e.g., such as an Internet Protocol address or Instant Messaging service username such as depicted in Figures 7, 8, and 9 and described in their accompanying text). Subsequent to the resolution,

25 method step 1808 shows MC-COA attempts to establish (e.g., via Instant Messaging services in conjunction with usernames such as depicted and/or described herein) COA channel over IP WAN with a Cost Optimization Application Program co-resident with Terminal C (COA-C) (e.g., as

30 depicted in Figure 10 and described in its accompanying text). Thereafter, method step 1810 shows an inquiry as to whether the COA channel was successfully established. In the event that the inquiry of method step 1810 yields

a determination that the COA channel was not successfully established, the process proceeds to method step 1812 which shows that the multipoint controller is informed that the Call Optimization Application is not available.

5   Consequently, thereafter method step 1814 depicts that the multipoint controller resumes normal operations (i.e., multipoint controller 118 initiates call to terminal entity C).

If the inquiry of method step 1810 yields a

10   determination that the COA channel was successfully established, the process proceeds to method step 1816 which illustrations that COA-C gathers "cost," as viewed from COA-C's position within the network (which is the same as the location of terminal entity C which is to be

15   extended an invitation to join the conference call), of the media transport portion of terminal entity C originating a media transport channel with the multipoint processor, and sends that data to MC-COA over COA channel (e.g., as depicted in Figure 11 and described in its

20   accompanying text). Thereafter, method step 1818 shows that substantially contemporaneously, MC-COA gathers "cost," as viewed from MC-COA's position within the network (which is the same as the position of multipoint controller and processor), of originating a media

25   transport channel from the multipoint controllers position within the network to terminal entity C's position within the network (e.g., as depicted in Figure 12 and described in its accompanying text).

Method step 1820 depicts that, upon receipt of the

30   cost data from COA-C, MC-COA determines if it would be more cost effective for terminal entity C to originate the media transport channel with the multipoint controller (e.g., as depicted in Figure 12 and described

in its accompanying text). Thereafter, method step 1822
illustrates that MC-COA directs MC-COA token generator to
generate a token which contains information indicating
that terminal A is extending an invitation to terminal
5   entity C to join the conference call; in addition, if it
has been determined that it is more cost effective for
terminal entity C to originate the media transport
channel with the multipoint controller, the token will
contain information indicating that also (e.g., as
10   depicted in Figure 12 and described in its accompanying
text). Thereafter, method step 1824 shows that MC-COA
sends token to COA-C (e.g., via Instant Messaging
services in conjunction with usernames such as depicted
and/or described herein).

15   Method step 1826 depicts that, upon receipt of the
token, COA-C passes the token to COA-C token processor,
which decodes the information of the token; COA-C token
processor then sends a message to COA-C informing COA-C
of that information (e.g., a message that states "a
20   request to join conference call is being extended by
terminal A (equates to human user A), and MC-COA has
informed us that it is more cost effective for terminal
entity C to call establish the media transport channel
and has given us a password we can use to join the
25   ongoing conference call once we establish the media
transport channel"). An example of the foregoing was
described in relation to Figures 12 and 13. Method step
1828 illustrates that, subsequent to determining the
message contained within the received token, COA-C
30   presents notification (e.g., audio and/or visual in GUI
window) to a human user C that human user A has been
invited to join the conference call; in addition, if MC-
COA has indicated that it is more cost effective for

terminal entity C to establish the media transport
channel, the notification presents the user with options
of joining the call without originating the media
transport channel, or of joining the call and originating
5   the media transport channel (e.g., as depicted in
relation to Figure 12 and described in its accompanying
text).

In Figure 18B, method step 1830 shows an inquiry as
to whether COA-C has received input from human user C
10   indicating some response to the displayed invitation to
join the conference call?. In the event that the inquiry
of method step 1830 show that user input has been
received, illustrated is that the process proceeds to
method step 1836. In the event that the inquiry of
15   method step 1830 shows that no such input has been
received, the process proceeds to method step 1832 which
depicts an inquiry as to whether a time-out has occurred.
In the event that a time-out has not occurred, the
process proceeds to method step 1830 (In an alternate
20   embodiment, the timer is set in the MC-COA for the same
purpose.) However, in the event that the inquiry of
method step 1832 yields an inquiry that time-out has
occurred, the process proceeds to method step 1834 which
shows that a response is set "as if" human user C
25   indicated "invitation not accepted." Thereafter, the
process proceeds to method step 1836.

Method step 1836 depicts that COA-C instructs COA-C
generator to create modified-token indicating human user
C's response to the extended invitation options (e.g., as
30   depicted in Figure 14 and described in its accompanying
text). Thereafter, method step 1838 illustrates that the
modified-token, which contains the indication of the
response of human user C to the invitation to join the

conference call is sent to the MC-COA (e.g., as depicted in Figure 14 and described in its accompanying text).

Method step 1840 shows that, upon receipt of modified-token, MC-COA determines whether the invitation to join conference call has been accepted. Also, in the case where it is found to be more cost effective for user "C" to initiate the call, the modified-token indicates if user "C" has agreed to initiate the call. In the event that the invitation has been accepted, shown is that the process proceeds to method step 1846. In the event that the invitation has not been accepted, the process proceeds to method step 1842 which depicts that MC-COA informs the multipoint controller that the invitation was not accepted. Thereafter, method step 1844 shows that that the conference call proceeds unchanged, and user C is not added to the conference call.

Method step 1846 depicts the inquiry as to whether modified-token indicates that terminal entity C will be originating the media transport channel. In the event that the inquiry depicted in method step 1846 yields a determination that terminal entity C will not be originating the media transport channel, the process proceeds to method step 1848 which illustrates that MC-COA sends message to multipoint controller that the invitation to join the conference call has been accepted and that multipoint controller is to originate media transport channel with terminal entity C (e.g., as depicted in relation to Figure 15 and described in its accompanying text). Thereafter, method step 1850 shows that the multipoint controller originates media transport channel between multipoint controller and terminal entity C. Subsequently, assuming human user C begins to participate, method step 1852 depicts that Terminal C

(and hence human user C) is now participating in conference call (e.g., as depicted in relation to Figure 18 and described in its accompanying text). Thereafter, the process proceeds to method step 1854 and stops, after

5   human user C has been added to the conference call.

In the event that the inquiry depicted in method step 1846 yields a determination that terminal C will be originating the media transport channel, the process proceeds to method step 1856 which illustrates that MC-

10   COA informs multipoint controller that terminal C has will be calling in to join the conference call, and that terminal C will present a password (which was contained in the invitation token originally token sent to COA-C) to authenticate itself (e.g., as depicted in Figures 15,

15   16 and described in their accompanying text); noted in method step 1856 is that such presentation of a password serves as an additional security mechanism in that it provides a vehicle by which the multipoint controller can maintain identity specific control over what terminals

20   can call in and join the ongoing ad-hoc conference call. Thereafter, method step 1858 shows that COA-C causes terminal C to originate a media transport channel into the conference call and presents a password to as it would normally do when joining a "meet me" conference

25   call.   Subsequently, method step 1860 depicts that terminal entity C is added to conference call, wherein the call manager connects the media transport channel for terminal entity C to multipoint processor 120, just as it would for any "meet me" conference call (e.g., as

30   depicted in Figures 16, 17 and described in their accompanying text). Thereafter, assuming human user C begins to participate, method step 1852 depicts that Terminal C (and hence human user C) is now participating

in conference call (e.g., as depicted in Figure 17 and described in its accompanying text). Subsequently, the process proceeds to method step 1854 and stops, after human user C has been added to the conference call.

5   Other Embodiments

The preceding discussion has described processes and devices in the context of an ad-hoc conference mode conference call wherein a token is passed. Those having skill in the art will recognize that such token may be
10   passed directly or by reference.

The foregoing discussion has described the process as ending off with the addition of a conference call participant. However, in another embodiment an additional feature is that, at the termination of a media
15   transport channel originated by terminal entity C, the origination costs may be determined and sent to the multipoint controller multipoint controller.

In another embodiment, to prevent fraud, the exchanged tokens, described above, may be encrypted.

20   In another embodiment, when a MC-COA (e.g., MC-COA 702 as discussed and described above) determines that it is unable to establish a COA channel with its counterpart on another computer system (e.g., COA-C as discussed and described above), the MC-COA sends a message to a
25   multipoint controller that the COA option is not available. In response to such message, the multipoint controller resumes normal processing as it would in the absence of the COA scheme. The foregoing makes the COA scheme substantially backwards compatible with existing
30   systems, since if the COA option is not available, the multipoint controller resumes related-art operations.

In another embodiment, a party inviting another party to a conference call can specify that only ad-hoc mode will be used with respect to the invitee, in response to which the MC-COA will not utilize the call
5   optimization features with respect to the invitee. In yet another embodiment, a party can specify that the only ad-hoc mode will be used for an entire call, in response to which the MC-COA will not utilize the call optimization features with respect to any invitee.

10   The foregoing detailed description has described various devices and processes. The devices and processes described provide all or part of the following advantages:(a) an IP-based communication channel among endpoints and a multipoint controller to perform call
15   origination negotiation; (b) a mechanism for automatically optimizing the direction of a call in a multipoint call; (c) an optimization policy using 1 or more criteria; (d) backward compatibility with existing systems (existing systems can communicate with the
20   enhanced system described herein without taking advantage of the features presented herein -- that is, to existing systems the enhanced system described herein would be substantially transparent); (e) a mechanism for providing a user with information about a prospective multipoint
25   call before he agrees to participate in it; (f) a mechanism for providing the user with information about a prospective multipoint call before he agrees to be charged for participating in it, and (g) a mechanism to settle costs after the call is terminated.

30   The foregoing detailed description has set forth various embodiments of the present invention via the use of block diagrams, flowcharts, and examples. It will be understood as notorious by those within the art that each

block diagram component, flowchart step, and operations
and/or components illustrated by the use of examples can
be implemented, individually and/or collectively, by a
wide range of hardware, software, firmware, or any

5   combination thereof. In one embodiment, the present
invention may be implemented via Application Specific
Integrated Circuits (ASICs). However, those skilled in
the art will recognize that the embodiments disclosed
herein, in whole or in part, can be equivalently

10   implemented in standard Integrated Circuits, as a
computer program running on a computer, as firmware, or
as virtually any combination thereof and that designing
the circuitry and/or writing the code for the software or
firmware would be well within the skill of one of

15   ordinary skill in the art in light of this disclosure. In
addition, those skilled in the art will appreciate that
the mechanisms of the present invention are capable of
being distributed as a program product in a variety of
forms, and that an illustrative embodiment of the present

20   invention applies equally regardless of the particular
type of signal bearing media used to actually carry out
the distribution. Examples of signal bearing media
include but are not limited to the following: recordable
type media such as floppy disks, hard disk drives, CD

25   ROMs, digital tape, read only memory (ROM), random access
memory (RAM) (such as when executable code derived from
source code is placed in memory during execution), and
transmission type media such as digital and analogue
communication links using either synchronous or

30   asynchronous communication links (e.g., TDM, packet, ATM,
frame based communications links, or any combination of
the foregoing described links).

The above description is intended to be illustrative
of the invention and should not be taken to be limiting.
Other embodiments within the scope of the present
invention are possible. Those skilled in the art will
5   readily implement the steps necessary to provide the
structures and the methods disclosed herein, and will
understand that the process parameters and sequence of
steps are given by way of example only and can be varied
to achieve the desired structure as well as modifications
10 that are within the scope of the invention. Variations
and modifications of the embodiments disclosed herein may
be made based on the description set forth herein,
without departing from the spirit and scope of the
invention as set forth in the following claims. For
15 example, although AOL Instant Messaging services are
described herein, those skilled in the art will recognize
that other Instant Messaging services, with only a
minimum of experimentation well within the skill of those
in the art, can be substituted therefore within the
20 spirit of the description set forth herein.

Other embodiments are within the following claims.

While particular embodiments of the present
invention have been shown and described, it will be
obvious to those skilled in the art that, based upon the
25 teachings herein, changes and modifications may be made
without departing from this invention and its broader
aspects and, therefore, the appended claims are to
encompass within their scope all such changes and
modifications as are within the true spirit and scope of
30 this invention. Furthermore, it is to be understood that
the invention is solely defined by the appended claims.
It will be understood by those within the art that if a
specific number of an introduced claim element is

intended, such an intent will be explicitly recited in the claim, and in the absence of such recitation no such limitation is present. For non-limiting example, as an aid to understanding, the following appended claims may

5   contain usage of the introductory phrases "at least one" and "one or more" to introduce claim elements. However, the use of such phrases should <u>not</u> be construed to imply that the introduction of a claim element by the indefinite articles "a" or "an" limits any particular

10   claim containing such introduced claim element to inventions containing only one such element, even when same claim includes the introductory phrases "one or more" or "at least one" and indefinite articles such as "a" or "an"; the same holds true for the use of definite

15   articles used to introduce claim elements. In addition, even if a specific number of an introduced claim element *is* explicitly recited, those skilled in the art will recognize that such recitation should typically be interpreted to mean *at least* the recited number (e.g.,

20   the bare recitation of "two elements," without other modifiers, typically means *at least* two elements, or *two or more* elements).